Trend Study 17-44-02

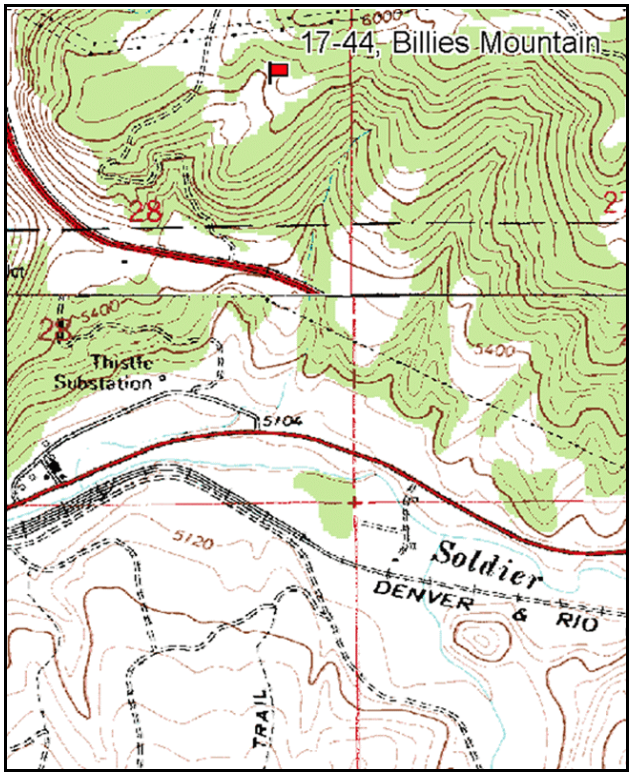
Study site name: Billies Mountain . Vegetation type: Big Sagebrush-Grass .

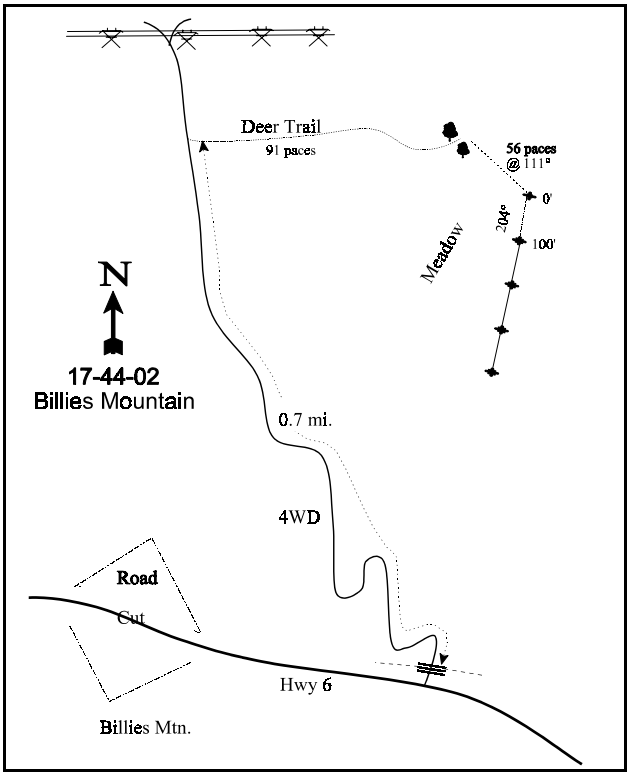
Compass bearing: frequency baseline 204 degrees magnetic.

Frequency belt placement: line 1 (11 & 95 ft), line 2 (34 ft), line 3 (59 ft), line 4 (71 ft).

LOCATION DESCRIPTION

On Highway 6 and 89 in Spanish Fork Canyon, east of the new road cut through Billies Mountain and 0.9 miles west of the junction of Route 89 south to Manti and US 6, turn north onto a dirt road. Cross a cattle guard and follow the road up 0.7 miles to where it breaks out into a sagebrush/grass flat. On the right, at the head of a small drainage, a game trial heads east towards a small meadow. Follow this trail approximately 150 yards to 2 large junipers at the edge of the meadow. From the junipers, walk up the near slope 56 paces bearing 111 degrees to the 0-foot baseline stake. This fencepost is marked by browse tag number 3951.





Map Name: Billies Mountain

Diagrammatic Sketch

Township 9S , Range 4E , Section 28

GPS: NAD 27, UTM 12S 4428270 N 458871 E

DISCUSSION

Billies Mountain - Trend Study No. 17-44

The Billies Mountain study is located east of the deep road cut constructed in 1983 due to the Billie's Mountain mudslide. The study samples deer winter range at 5,800 feet elevation. Slope varies from 5 to 20% with a south to southwest aspect. The range type is big sagebrush-grass with a variety of other shrubs interspersed throughout. In 1983, deer use was moderate to heavy while elk and cattle use was light. In 1989, it was reported that deer were using the site year round with little elk sign evident. The allotment was rested in 1989 from livestock use. During the 1997 reading, deer and elk use appeared moderate to heavy with little cattle use. A pellet group transect read along the study baseline in 2002 estimated 36 deer and 11 elk days use/acre (89 ddu/ha and 28 edu/ha). Cattle were on site when the site was read (6/5/02) and had utilized many of the grasses. At the time the study was read, cattle use was estimated at 15 days use/acre (38 cdu/ha). Most of the big game pellet groups appear to be from winter use.

Soil is relatively deep, grey in color, with little rock. Textural analysis indicates a clay soil with an effective rooting depth of 21 inches. Temperature, measured at 18 inches in depth, was estimated at 49°F in 1997. Soil phosphorous is quite low at only 4.6 ppm. Values less than 10 ppm have been found to limit plant growth and development. The study is located near the head of a small swale where sedimentation is common. Ground cover from vegetation is good with no erosion apparent. The erosion condition class was determined to be stable in 2002.

The site supports a variety of shrubs with a thick perennial grass understory. An old stand of mountain big sagebrush is the key browse species. It contributes over one-third of the total shrub cover. This population appears to have some basin big sagebrush characteristics but was identified as mountain big sagebrush. Density was estimated at about 2,400 plants/acre in 1983 and 1989. Plants appeared to be moderately to heavily hedged with poor vigor and high decadence. A much larger sample was used in 1997 which estimated 1,260 sagebrush per acre. Use was more moderate but vigor was still poor and over half of the population consisted of decadent plants. The population remained stable in 2002 at nearly 1,200 plants/acre, but it appears that the population is still receiving heavy use. Over half of the population was decadent and 52% of the decadent sagebrush sampled were classified as dying (>50% crown death). Young recruitment has improved however. Annual leader growth was good averaging 2 inches in 2002. It appears that the thick perennial grass understory combined with heavy winter use are keeping sagebrush in a static condition. Most sagebrush on site are overly mature and recruitment is difficult. Continued livestock use in the spring and early summer could help to improve the sagebrush stand. However, this should be monitored closely to ensure that in dry years the livestock would not be over utilizing the sagebrush.

A small stand of bitterbrush provides some additional preferred winter forage. Density was estimated at 380 plants/acre in 2002. Bitterbrush displayed heavy use in 1997 and 2002, but vigor remained good. Annual leader growth was marginal in 2002 averaging 1.7 inches. Other browse species include gray horsebrush, snowberry, Wood's rose, broom snakeweed, chokecherry, white rubber rabbitbrush, stickyleaf low rabbitbrush, dwarf rabbitbrush, and Saskatoon serviceberry. These populations have changed very little since 1983.

The herbaceous understory is abundant and exceptionally diverse. Grasses provided a cover value of nearly 25% in 1997, declining slightly to 19% in 2002. A diverse forb composition produced a cover value of 21% during the 1997 reading, while dry conditions in 2002 caused a decline in forb cover to 18% . A total of 14 grass species were found on the site in 1997 and 2002. Bluebunch wheatgrass is the most abundant perennial grass. It provided 37% of the total grass cover in 1997 increasing to 49% in 2002. Other common grasses include crested wheatgrass, bulbous bluegrass, and Kentucky bluegrass. Cheatgrass is present but will likely not increase due to competition with other species.

The forb composition is dominated by Pacific aster which is an increaser under heavy grazing pressure. It provided 39% of the forb cover in 1997 increasing to 56% in 2002. Other less common forbs include Louisiana sage, western yarrow, thistle, rock goldenrod, longleaf phlox, and American vetch.

1983 APPARENT TREND ASSESSMENT

The soil appears stable. Ground cover, in the form of vegetation and litter, is good to excellent and only minimal erosion is occurring. Browse trend appears to be declining. Mountain big sagebrush is in poor health and not adequately reproducing. In contrast, grasses, forbs and to a lesser extent mountain snowberry appear to all be expanding. Intense spring livestock grazing might be a viable management option to encourage reproduction of shrubs.

1989 TREND ASSESSMENT

The soil trend is stable. Although disturbed soil has a high erosion hazard, the protective cover maintains minimal erosion. The browse trend is slightly downward. Although the causes are not clear at this time, the sagebrush appears to be continuing its decline through increased decadence and lack of recruitment. As with several other studies on this herd unit, the data shows an increased percentage of vegetative ground cover. The herbaceous understory, still very diverse and productive, does not appear to have expanded significantly. Grass frequency is the same, while forb frequency only slightly increased.

TREND ASSESSMENT
soil - stable (3)
browse - down slightly (2)
herbaceous understory - stable (3)

1997 TREND ASSESSMENT

The soil trend is slightly upward. Erosion was noticeable in the past but it does not appear to be occurring at this time. Percent bare soil has declined and there is adequate vegetative and litter cover to protect the soil. The browse trend is slightly upward as well. Utilization of the key species, mountain big sagebrush, has declined as well as percent decadency. Past heavy utilization and the growing competition of the herbaceous understory are likely the cause of this decadent mountain big sagebrush stand which has only marginal recruitment (seedlings 2% and 5% young plants). Other species, with the exception of bitterbrush, are only lightly utilized and do not appear to be expanding at this time. The herbaceous understory trend is slightly upward with an increase in nested frequency for grasses and forbs.

TREND ASSESSMENT
soil - up slightly (4)
browse - up slightly (4)
herbaceous understory - up slightly (4)

2002 TREND ASSESSMENT

Trend for soil is slightly down due to an increase in bare soil and a decline in litter. There is still adequate protective ground cover to prevent most erosion and the soil erosion condition class was determined to be stable. Trend for browse is stable for the key species, mountain big sagebrush. The population is still in poor condition with 57% of the shrubs sampled classified as decadent. Utilization remains heavy and recruitment marginal. Bitterbrush displays heavier use than reported in 1997. Vigor remains good on most plants but the number of decadent plants increased. Trend for the herbaceous understory is stable. Sum of nested frequency for perennial grasses and forbs declined slightly but not enough to warrant a downward trend. The key grass, bluebunch wheatgrass, and the most abundant forb, Pacific aster, remained stable in nested frequency. There was some difficulty in identifying some grasses due to use and lack of seed heads. The abundant herbaceous understory is partly responsible for the poor condition of the mountain big sagebrush stand. Continued spring livestock grazing may improve the shrub component but the composition of the herbaceous understory already contains several weedy increasers. The herbaceous composition could easily worsen with heavy grazing.

TREND ASSESSMENT
soil - slightly down (2)
browse - stable but poor (3)
herbaceous understory - stable (3)

HERBACEOUS TRENDS --
Herd unit 17 , Study no: 44

Type	Species	Nested Frequency				Quadrat Frequency				Average Cover %	
		'83	'89	'97	'02	'83	'89	'97	'02	'97	'02
G	Agropyron cristatum	a-	a-	c11	55	-	-	5	22	.48	1.99
G	Agropyron smithii	a-	ab6	b13	b21	-	2	5	7	.05	.58
G	Agropyron spicatum	a149	ab182	b202	ab175	55	69	66	54	8.94	9.46
G	Agropyron trachycaulum	ab9	c22	a-	bc13	3	10	-	5	-	.19
G	Bromus inermis	-	-	7	10	-	-	2	3	.30	.79
G	Bromus tectorum (a)	-	-	b60	a4	-	-	21	2	.87	.01
G	Carex spp.	6	-	-	-	2	-	-	-	-	-
G	Elymus glaucus	9	-	3	-	4	-	1	-	.63	-
G	Elymus junceus	-	-	-	4	-	-	-	1	-	.63
G	Koeleria cristata	24	4	26	7	9	3	9	3	.70	.09
G	Melica bulbosa	14	24	38	13	6	12	13	6	1.52	.13
G	Oryzopsis hymenoides	4	2	-	-	2	1	-	-	-	-
G	Poa bulbosa	a5	a7	b58	c82	2	3	19	28	1.60	2.79
G	Poa fendleriana	b37	a16	a13	ab31	17	6	6	11	.66	.66
G	Poa pratensis	a99	b156	ab126	a97	39	61	41	34	6.76	1.46
G	Poa secunda	a-	a1	c69	b34	-	1	30	17	1.58	.35
G	Sitanion hystrix	bc16	c23	ab7	a-	9	10	2	-	.06	-
G	Stipa lettermani	b44	a22	a10	a8	21	9	5	3	.31	.07
Total for Annual Grasses		0	0	60	4	0	0	21	2	0.87	0.00
Total for Perennial Grasses		416	465	583	550	169	187	204	194	23.62	19.21
Total for Grasses		416	465	643	554	169	187	225	196	24.50	19.22
F	Achillea millefolium	b89	a32	a33	a41	37	17	16	16	1.06	.91
F	Alyssum alyssoides (a)	-	-	2	-	-	-	1	-	.00	-
F	Allium spp.	a3	b15	b22	ab12	1	10	10	4	.05	.39
F	Antennaria rosea	10	-	-	-	3	-	-	-	-	-
F	Artemisia ludoviciana	37	55	42	45	15	21	17	20	1.49	1.05
F	Aster chilensis	b301	b310	a225	a248	97	97	74	81	8.27	10.07
F	Astragalus convallarius	b68	b82	b58	a24	30	36	24	13	.78	.34
F	Astragalus spp.	3	7	-	-	1	4	-	-	-	-
F	Astragalus utahensis	12	14	14	10	5	7	6	4	.25	.33
F	Camelina microcarpa (a)	-	-	b16	a1	-	-	6	1	.13	.00
F	Calochortus nuttallii	11	19	21	19	7	13	11	10	.05	.07
F	Cirsium spp.	a7	ab21	c47	bc36	6	11	23	17	1.50	.39
F	Collomia linearis (a)	-	-	7	-	-	-	4	-	.02	-
F	Comandra pallida	a-	a-	b11	a1	-	-	6	1	.03	.00
F	Crepis acuminata	-	-	6	8	-	-	3	4	.02	.09
F	Cymopterus spp.	a-	a-	b9	b12	-	-	5	6	.07	.37

Type	Species	Nested Frequency				Quadrat Frequency				Average Cover %	
		'83	'89	'97	'02	'83	'89	'97	'02	'97	'02
F	Cynoglossum officinale	-	-	5	2	-	-	3	2	.01	.01
F	Epilobium brachycarpum (a)	-	-	$_{b}$81	$_{a}$33	-	-	33	13	.51	.06
F	Eriogonum brevicaule	4	6	11	3	2	3	5	3	.10	.04
F	Eriogonum racemosum	-	-	-	1	-	-	-	1	-	.00
F	Eriogonum umbellatum	-	3	5	3	-	1	2	2	.01	.03
F	Galium aparine (a)	-	-	29	22	-	-	11	10	.56	.19
F	Hackelia patens	11	2	12	4	5	1	6	1	.03	.00
F	Helianthus annuus (a)	1	-	-	-	1	-	-	-	-	-
F	Lactuca serriola	$_{a}$-	$_{b}$12	$_{c}$33	$_{a}$-	-	6	14	-	.24	-
F	Lithospermum ruderale	-	-	1	1	-	-	1	1	.03	.15
F	Medicago sativa	$_{c}$113	$_{ab}$10	$_{b}$18	$_{a}$-	33	4	7	-	.35	-
F	Petradoria pumila	$_{a}$-	$_{a}$-	$_{b}$25	$_{c}$32	-	-	11	13	1.05	1.81
F	Phlox longifolia	$_{a}$4	$_{c}$128	$_{b}$67	$_{b}$88	2	56	27	39	.21	.66
F	Polygonum douglasii (a)	-	-	2	1	-	-	1	1	.00	.00
F	Sphaeralcea coccinea	-	-	-	3	-	-	-	1	-	.00
F	Taraxacum officinale	1	1	-	-	1	1	-	-	-	-
F	Tragopogon dubius	12	16	31	9	7	10	12	7	.90	.06
F	Veronica biloba (a)	-	-	-	3	-	-	-	1	-	.00
F	Vicia americana	$_{a}$-	$_{a}$-	$_{c}$131	$_{b}$98	-	-	48	48	2.65	.89
F	Viguiera multiflora	17	22	30	10	12	11	14	4	.56	.04
Total for Annual Forbs		1	0	137	60	1	0	56	26	1.23	0.27
Total for Perennial Forbs		703	755	857	710	264	309	345	298	19.77	17.76
Total for Forbs		704	755	994	770	265	309	401	324	21.01	18.04

Values with different subscript letters are significantly different at alpha = 0.10

BROWSE TRENDS --
Herd unit 17 , Study no: 44

Type	Species	Strip Frequency '97	Strip Frequency '02	Average Cover % '97	Average Cover % '02
B	Amelanchier alnifolia	2	3	.03	-
B	Artemisia tridentata vaseyana	50	48	4.69	4.34
B	Chrysothamnus depressus	7	6	.03	.03
B	Chrysothamnus nauseosus albicaulis	21	16	.48	.54
B	Chrysothamnus viscidiflorus viscidiflorus	24	25	1.67	1.21
B	Eriogonum heracleoides	-	-	-	.00
B	Gutierrezia sarothrae	17	20	.31	.16
B	Juniperus osteosperma	2	2	1.78	1.78
B	Prunus virginiana	1	2	.15	-
B	Purshia tridentata	14	12	1.89	2.50
B	Rosa woodsii	3	3	.15	.15
B	Symphoricarpos oreophilus	9	10	1.16	1.82
B	Tetradymia canescens	9	9	.30	.09
Total for Browse		159	156	12.67	12.66

CANOPY COVER --
Herd unit 17 , Study no: 44

Species	Percent Cover '97	Percent Cover '02
Juniperus osteosperma	3	4

Key Browse Annual Leader Growth
Herd unit 17 , Study no: 44

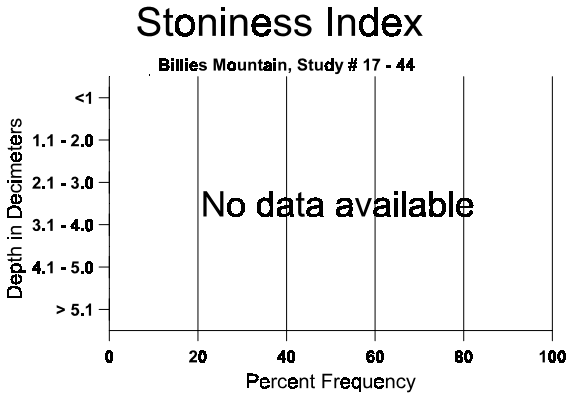
Species	Average leader growth (in) '02
Artemisia tridentata vaseyana	2.1

BASIC COVER --
Herd unit 17 , Study no: 44

Cover Type	Nested Frequency '97	Nested Frequency '02	Average Cover % '83	Average Cover % '89	Average Cover % '97	Average Cover % '02
Vegetation	377	359	5.25	12.50	46.86	54.50
Rock	56	64	.50	.75	.68	.42
Pavement	197	224	1.25	4.75	1.09	1.27
Litter	398	373	64.00	58.25	54.79	38.76
Cryptogams	52	19	0	0	1.70	.42
Bare Ground	251	287	29.00	23.75	14.87	19.72

SOIL ANALYSIS DATA --
Herd Unit 17, Study no: 44, Billies Mountain

Effective rooting depth (in)	Temp °F (depth)	pH	%sand	%silt	%clay	%0M	PPM P	PPM K	dS/m
21.1	49.0 (17.7)	7.4	23.4	20.7	55.8	2.2	4.6	323.2	.7



PELLET GROUP FREQUENCY --
Herd unit 17 , Study no: 44

Type	Quadrat Frequency '97	Quadrat Frequency '02
Sheep	-	1
Rabbit	-	1
Elk	25	18
Deer	37	15
Cattle	2	9

Pellet Transect	
Pellet Groups per Acre ⁄02	Days Use per Acre (ha) ⁄02
9	1 (2)
-	-
148	11 (28)
470	36 (89)
183	15 (38)

BROWSE CHARACTERISTICS --
Herd unit 17 , Study no: 44

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Amelanchier alnifolia																		
Y	83	-	1	-	-	-	-	-	-	-	1	-	-	-	33			1
	89	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	97	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	02	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1
M	83	-	-	2	-	-	-	-	-	-	-	2	-	-	66	34	40	2
	89	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	97	1	1	-	-	-	-	-	-	-	2	-	-	-	40	21	25	2
	02	-	1	1	-	-	-	-	-	-	2	-	-	-	40	23	34	2

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'83	33%	67%	00%	
'89	00%	00%	00%	
'97	50%	00%	00%	+33%
'02	33%	33%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
'83	99	Dec:		-
'89	0			-
'97	40			-
'02	60			-

Artemisia tridentata vaseyana																		
S	83	3	-	-	-	-	-	-	-	-	3	-	-	-	100			3
	89	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	97	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1
	02	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
Y	83	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	89	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	97	3	-	-	-	-	-	-	-	-	3	-	-	-	60			3
	02	2	1	-	3	-	-	-	-	-	6	-	-	-	120			6
M	83	4	19	10	-	-	-	-	-	-	25	-	8	-	1100	22	34	33
	89	3	3	4	-	-	-	-	-	-	9	1	-	-	333	24	20	10
	97	8	18	-	-	-	-	-	-	-	26	-	-	-	520	27	37	26
	02	2	5	12	-	-	-	-	-	-	19	-	-	-	380	27	31	19
D	83	5	19	13	-	-	-	-	-	-	1	-	36	-	1233			37
	89	10	38	15	-	-	-	-	-	-	51	3	1	8	2100			63
	97	17	15	1	1	-	-	-	-	-	9	-	-	25	680			34
	02	4	9	20	-	-	-	-	-	-	16	-	-	17	660			33
X	83	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	89	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	97	-	-	-	-	-	-	-	-	-	-	-	-	-	860			43
	02	-	-	-	-	-	-	-	-	-	-	-	-	-	600			30

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'83	54%	33%	63%	+ 4%
'89	56%	26%	12%	-48%
'97	52%	02%	40%	- 8%
'02	26%	55%	29%	

Total Plants/Acre (excluding Dead & Seedlings)			
'83	2333	Dec:	53%
'89	2433		86%
'97	1260		54%
'02	1160		57%

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Chrysothamnus depressus																		
Y	83	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	89	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	97	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1
	02	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
M	83	4	-	-	-	-	-	-	-	-	4	-	-	-	133	9	11	4
	89	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	97	22	-	-	-	-	-	-	-	-	22	-	-	-	440	8	11	22
	02	7	1	-	-	-	-	-	-	-	8	-	-	-	160	7	10	8
D	83	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	89	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	97	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	02	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'83	00%	00%	00%	
'89	00%	00%	00%	
'97	00%	00%	00%	-61%
'02	11%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
	'83	133	Dec:	0%
	'89	0		0%
	'97	460		0%
	'02	180		11%

Chrysothamnus nauseosus albicaulis																		
Y	83	1	1	-	-	-	-	-	-	-	2	-	-	-	66			2
	89	5	-	-	-	-	-	-	-	-	5	-	-	-	166			5
	97	3	-	-	-	-	-	-	-	-	3	-	-	-	60			3
	02	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
M	83	6	3	-	-	-	-	-	-	-	9	-	-	-	300	18	13	9
	89	9	-	-	1	-	-	-	-	-	10	-	-	-	333	20	17	10
	97	29	1	-	-	-	-	-	-	-	30	-	-	-	600	19	19	30
	02	11	3	-	-	-	-	-	-	-	14	-	-	-	280	22	30	14
D	83	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	89	6	1	-	-	-	-	-	-	-	6	1	-	-	233			7
	97	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	02	4	1	1	-	-	-	1	-	-	7	-	-	-	140			7
X	83	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	89	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	97	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	02	-	-	-	-	-	-	-	-	-	-	-	-	-	20			1

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'83	36%	00%	00%	+50%
'89	05%	00%	00%	-10%
'97	03%	00%	00%	-36%
'02	19%	05%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
	'83	366	Dec:	0%
	'89	732		32%
	'97	660		0%
	'02	420		33%

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Chrysothamnus viscidiflorus viscidiflorus																		
Y	83	3	-	-	-	-	-	-	-	-	3	-	-	-	100			3
	89	10	-	-	1	-	-	-	-	-	11	-	-	-	366			11
	97	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1
	02	3	-	-	-	-	-	-	-	-	3	-	-	-	60			3
M	83	22	-	-	-	-	-	-	-	-	22	-	-	-	733	16	13	22
	89	35	-	-	-	-	-	-	-	-	35	-	-	-	1166	14	16	35
	97	33	-	-	-	-	-	-	-	-	33	-	-	-	660	15	18	33
	02	32	-	-	1	-	-	-	-	-	32	1	-	-	660	11	17	33
D	83	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	89	5	-	-	-	-	-	-	-	-	4	-	1	-	166			5
	97	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1
	02	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
X	83	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	89	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	97	-	-	-	-	-	-	-	-	-	-	-	-	-	20			1
	02	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'83	00%	00%	00%	+51%
'89	00%	00%	02%	-59%
'97	00%	00%	00%	+ 3%
'02	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
	'83	833	Dec:	0%
	'89	1698		10%
	'97	700		3%
	'02	720		0%

Gutierrezia sarothrae																		
Y	83	2	-	-	-	-	-	-	-	-	2	-	-	-	66			2
	89	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	97	14	-	-	-	-	-	-	-	-	14	-	-	-	280			14
	02	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
M	83	10	-	-	-	-	-	-	-	-	10	-	-	-	333	9	8	10
	89	19	-	-	-	-	-	-	-	-	19	-	-	-	633	9	10	19
	97	30	-	-	-	-	-	-	-	-	30	-	-	-	600	9	8	30
	02	46	-	-	-	-	-	-	-	-	46	-	-	-	920	8	6	46
D	83	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	89	1	-	-	-	-	-	-	-	-	-	-	-	1	33			1
	97	2	-	-	-	-	-	-	-	-	2	-	-	-	40			2
	02	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'83	00%	00%	00%	+40%
'89	00%	00%	05%	+28%
'97	00%	00%	00%	+ 2%
'02	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
	'83	399	Dec:	0%
	'89	666		5%
	'97	920		4%
	'02	940		2%

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Juniperus osteosperma																		
S	83	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	89	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	97	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1
	02	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
M	83	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	89	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	97	2	-	-	-	-	-	-	-	-	2	-	-	-	40	-	-	2
	02	3	-	-	-	-	-	-	-	-	3	-	-	-	60	-	-	3

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'83	00%	00%	00%	
'89	00%	00%	00%	
'97	00%	00%	00%	+33%
'02	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
'83	0	Dec:		-
'89	0			-
'97	40			-
'02	60			-

Prunus virginiana																		
S	83	1	-	-	-	-	-	-	-	-	1	-	-	-	33			1
	89	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	97	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	02	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
Y	83	-	4	-	-	-	-	-	-	-	3	-	1	-	133			4
	89	6	-	-	-	-	-	-	-	-	6	-	-	-	200			6
	97	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	02	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
M	83	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	89	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	97	3	-	-	-	-	-	-	-	-	3	-	-	-	60	16	16	3
	02	1	-	-	-	-	-	-	-	-	1	-	-	-	20	27	23	1
D	83	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	89	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	97	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	02	-	-	1	-	-	-	-	-	-	1	-	-	-	20			1

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'83	100%	00%	25%	+34%
'89	00%	00%	00%	-70%
'97	00%	00%	00%	-33%
'02	00%	50%	00%	

Total Plants/Acre (excluding Dead & Seedlings)			
'83	133	Dec:	0%
'89	200		0%
'97	60		0%
'02	40		50%

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Purshia tridentata																		
Y	83	1	-	-	-	-	-	-	-	-	1	-	-	-	33			1
	89	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	97	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1
	02	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
M	83	2	3	2	-	-	-	-	-	-	7	-	-	-	233	16	33	7
	89	8	1	-	-	-	-	-	-	-	9	-	-	-	300	16	29	9
	97	1	6	14	-	3	-	-	-	-	24	-	-	-	480	20	37	24
	02	1	3	9	-	-	2	-	-	-	15	-	-	-	300	15	34	15
D	83	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	89	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	97	-	1	1	-	-	-	-	-	-	-	-	-	2	40			2
	02	-	-	3	-	-	1	-	-	-	3	-	-	1	80			4

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'83	38%	25%	00%	+11%
'89	11%	00%	00%	+44%
'97	37%	56%	07%	-30%
'02	16%	79%	05%	

Total Plants/Acre (excluding Dead & Seedlings)				
'83	266	Dec:	0%
'89	300		0%
'97	540		7%
'02	380		21%

Rosa woodsii																		
Y	83	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	89	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	97	2	-	-	-	-	-	-	-	-	2	-	-	-	40			2
	02	5	-	-	-	-	-	-	-	-	5	-	-	-	100			5
M	83	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	89	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	97	3	-	-	-	-	-	-	-	-	3	-	-	-	60	10	13	3
	02	3	-	-	-	-	-	-	-	-	3	-	-	-	60	7	10	3

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'83	00%	00%	00%	
'89	00%	00%	00%	
'97	00%	00%	00%	+38%
'02	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)			
'83	0	Dec:	-
'89	0		-
'97	100		-
'02	160		-

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Symphoricarpos oreophilus																		
S	83	1	-	-	-	-	-	-	-	-	1	-	-	-	33			1
	89	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	97	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1
	02	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
Y	83	25	1	-	-	-	-	-	-	-	22	4	-	-	866			26
	89	17	-	-	-	-	-	-	-	-	17	-	-	-	566			17
	97	11	-	-	-	-	-	-	-	-	11	-	-	-	220			11
	02	9	-	-	-	-	-	-	-	-	9	-	-	-	180			9
M	83	6	6	1	-	-	-	-	-	-	8	4	1	-	433	13	14	13
	89	14	-	-	9	-	-	-	-	-	23	-	-	-	766	17	11	23
	97	4	-	-	1	-	-	-	-	-	5	-	-	-	100	20	47	5
	02	23	2	-	-	-	-	-	-	-	21	4	-	-	500	15	32	25

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'83	18%	03%	03%	+ 2%
'89	00%	00%	00%	-76%
'97	00%	00%	00%	+53%
'02	06%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
	'83	1299	Dec:	-
	'89	1332		-
	'97	320		-
	'02	680		-

Tetradymia canescens																		
S	83	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	89	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	97	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	02	3	-	-	-	-	-	-	-	-	3	-	-	-	60			3
Y	83	2	-	-	-	-	-	-	-	-	2	-	-	-	66			2
	89	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	97	5	-	-	1	-	-	-	-	-	6	-	-	-	120			6
	02	4	-	-	-	-	-	-	-	-	4	-	-	-	80			4
M	83	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	89	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	97	20	-	-	-	-	-	-	-	-	20	-	-	-	400	10	14	20
	02	23	1	-	-	-	-	-	-	-	23	1	-	-	480	8	15	24

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'83	00%	00%	00%	
'89	00%	00%	00%	
'97	00%	00%	00%	+ 7%
'02	04%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
	'83	66	Dec:	-
	'89	0		-
	'97	520		-
	'02	560		-